

THE EFFECT OF VITAMIN D ON ERADICATION OF HELICOBACTER PYLORI

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Abstract:

Background: Helicobacter Pylori(H.Pylori) is a very common bacterium infecting nearly half of population worldwide. Its eradication is related to multiple factors including host immune state and treatment regimens. Sufficient Serum Vitamin D may be associated with H. Pylori and its eradication rate.

The aim of this study is to find any association of serum Vitamin D and H. Pylori eradication success rate.

Patients and methods: 40 patients with upper gastrointestinal symptoms were involved in the study who were infected with Pylori and their urea breath were over 50 count per minute .They were treated by Levofloxacin- based triple therapy for 14 days, with estimation of their serum vitamin D. Re-testing done after 8 weeks to assess the success rate of eradication.

Results: There was no association between serum level of vitamin D level and success rate of eradication as p value was 0.111. The eradication success rate was 54%.

Conclusion: No association was found between serum vitamin D level and the eradication success rate of H. Pylori.

Keywords: H. Pylori, Vitamin D, Eradication.

Introduction :

One of the most common infectious diseases of human being is Helicobacter Pylori (H. Pylori) which causes gastrointestinal disorders¹. It's a spiral shape Gram negative bacillus which adapt itself to live in acidic media of the stomach ,and colonize in the gastric mucosa, by the effect of the urease enzyme which neutralize gastric acid². The prevalence of H. Pylori infection is approximately 44.3% worldwide especially in developing countries and low socioeconomic state population^{3,4}. Its transmitted from person to person through feco-oral and oro-oral route⁵.

It may cause inflammation leading to gastritis and peptic ulcers , gastric cancer and gastric mucosa associated lymphoid tissue (MALT) lymphoma , however many infected persons

have no any gastrointestinal symptoms⁶. There are many invasive and non invasive tests to diagnose H. Pylori infection but the most accurate and sensitive non- invasive (reaching 95%) and specific (reaching 98%) test is urea breath test which can be used for primary diagnosis as well as for confirming eradication of the bacteria after therapy⁷.

The Maastricht VI/Florence consensus report in 2022 recommended that all infected patients with H. Pylori should receive treatment because it always causes gastritis, irrespective of symptoms or complications⁸. There are many different regimens for eradication of H. Pylori , one of them is levofloxacin based triple therapy, which include also Amoxicillin and Esomeprazole. Selection of appropriate eradication regimen for each region needs local surveillance

network because the resistance of the bacteria to the antibiotics has reached alarming levels worldwide⁸.

In addition to antibiotic resistance there are other factors relating to the success or failure of H. pylori eradication therapy, as virulence of the bacteria, host related genetic disorders however host immunity plays an important role against H. Pylori infection⁹. Recent studies has shown that Vitamin D has crucial role in regulation of cell proliferation and differentiation and enhance production of antimicrobial peptides (AMP) by immune cells¹⁰. In human being two main categories of antimicrobial peptide play a key role: cathelicidins and defensins, both secreted by epithelial cells of many tissues as respiratory, urogenital and gastro-intestinal tracts¹¹. In vitamin D deficiency ,the infected macrophages can not produce adequate amount of 1,25-(OH)₂D to upregulate the production of AMP cathelicidin which is well known to have broad spectrum activity against wide variety of pathogens including gram positive and gram negative bacteria¹². Cathelicidin AMP expression is increased by vitamin D treatment in gastric inflammation caused by H.Pylori¹³.Several previous studies showed that vitamin D may have anti H. Pylori effect and may have a role in eradication of the bacteria ¹⁴ ,however this is not supported by large sample of randomized controlled clinical trial .

The aim of this prospective study is to detect any relation between the serum level of Vitamin D and the success rate of H. Pylori eradication therapy by levofloxacin base triple therapy .

Patients and methods :

This study was prospective interventional study , carried out in outpatient consultation department of Rania Teaching Hospital from October 2021 to October 2022 . The sample of the study was a convenient sample of 81 Patients who were complaining of mainly upper gastrointestinal symptoms including

epigastric pain, dyspepsia , nausea and/or vomiting and abdominal distention . Data collection was done through a direct interview of all patients followed by full history and clinical examination . All those patients were tested for the presence of H. Pylori bacteria in their stomach by a urea breath test and were positive as their titre were above 50cpm .The reason behind choosing Urea breath test is because it's the most accurate non-invasive sensitive and specific test to diagnose H. Pylori infection⁷ .Meanwhile blood sample was taken from each patient to measure the level of Vitamin D in blood by Minivida technique . Vitamin D level less than 20ng/ml was regarded as deficient and more than or equal to 20ng/ml as sufficient . Patients younger than 18 years ,and pregnant ladies were excluded, this as well as those patients received proton pump inhibitors or antibiotics in the previous 2 weeks and 4 weeks respectively , and those received vitamin D supplements recently.Patients who had previously received, corticosteroids/immunosuppressive treatment, or had history of systemic inflammatory or autoimmune disorders, gastric surgery, renal failure, liver cirrhosis, and malignancies were all excluded. Informed consent was taken verbally from each participants. Ethical committee approval was taken from university of Raparin High committee of Ethics . All patients were treated by Levofloxacin-based triple therapy (Amoxicillin capsule 1gm and Esomeprazole capsule 40mg twice daily and Levofloxacin tablet 500mg once per day) for 14 days .Post eradication, rechecking for the H. Pylori infection by Urea breath test was done after 8 weeks .

Statistical analysis of data was done through SPSS program version 23. Descriptive and inferential Analysis of data (frequency, percentage , standard deviation). P value less than 0.05 was regarded as significant.

Results:

The present study recruited 81 patients but only 40 patients was followed up and come back for retesting by Urea breath test after eradication therapy and the rest of patients declined from follow up. The age was

ranging between 18-70 years with medium 39.50.

There was no significant relationship between the biographic data, clinical manifestations, serum Vitamin D level with the outcome of eradication therapy with a P value more than 0.05 .

Table1: Relationship between demographic Characteristics, clinical manifestations and serum vitamin D level with outcome of eradication therapy

variables	Post eradication therapy urea breath test result		P value
	Negative UBT (no.21) Successful treatment	Positive UBT (no.19) failed treatment	
Age in years (Less than 26/26-40/41-56/ more than 57 years)	4/9/5/3 (21)	1/7/7/4 (19)	0.488
Gender: (male/female)	4/17 (21)	3/16 (19)	0.787
Occupation:(Indoor/outdoor)	12/9 (21)	16/3 (19)	0.462
Education level: (Illiterate/primary school/secondary school/institute and university/postgraduate)	6/3/5/7/0 (21)	6/5/3/3/1 (19)	0.465
Address: (Urban /Rural)	14/7 (21)	14/5 (19)	0.629
Epigastric pain:(yes/no)	18/3 (21)	18/1(19)	0.342
Dyspepsia: (yes/no)	10/11 (21)	12/7 (19)	0.324
Fullness and bloating (Yes/no)	7/14 (21)	4/15 (19)	0.385
Nausea/ vomiting (Yes/no)	9/12 (21)	4/15 (19)	0.141
Change in bowel habit (Yes/no)	2/19 (21)	2/17 (19)	0.916
Vitamin D level ng/ml Deficient < 20 Sufficient ≥ 20	13 8	7 12	0.113
Pre-eradication UBT titer <100 cpm >100 cpm	8 13	3 16	0.115

Discussion:

This study assessed the effect of serum vitamin D level on eradication rate of H. Pylori bacteria in a sample of 40 patients. Our results shows that there is no association between the level of serum vitamin D and the success rate of therapeutic eradication of H. Pylori by the levofloxacin based triple therapy as the p value was 0.113. At the beginning of the study 81 patients were recruited , but only 40 patients were followed up for reassessment of H. Pylori infection status after 8 weeks of eradication therapy . Ages of the patients were ranging from 18 to 69 years with mean age was 40.7 ± 14.285 . There was no significant relation between the demographic data ,including ,age ,Gender ,occupation ,level of education and residency place whether urban or rural inhabitant with the success rate of eradication as P value is more than 0.05 as shown in table 1.

The findings in the current study are the rate of success for eradication which is 52.5% and failure rate 47.5%. This is inconsistent with the previous studies done by Perna, F. et al in Italy in which the success rate was 72.7% and other previous studies in which reaching to 87%¹⁵ . This may be explained by the drug resistance as levofloxacin is widely used by peoples for other diseases frequently even without prescription e.g. for urinary tract infection ,respiratory tract infection and postoperative wound prophylaxes. Primary levofloxacin resistance had been verified in previous studies in many countries, which was ranging from 14.3% in Japan to 32.3% in Italy¹⁶ . Resistance to Levofloxacin lowers success rate of Levofloxacin based triple therapy against H. Pylori by 20-40%¹⁷ .

Another factor related to failure of treatment is host genetic variation, those patients carrying alleles encoding active cytochrome

P450 2C19 isoenzymes is associated with increased metabolism of proton Pump inhibitors and decreased its pharmacologic effect¹⁸ .

Regarding the vitamin D level , there was no significant relation between the serum level of Vitamin D and the success rate of eradication . This is inconsistent with another study done by Shafrir A. et al in Israil on a large sample of 10170 patients with positive H. Pylori infection which verify successful eradication in those patients whose mean serum level of Vitamin D was higher¹⁹ . There was another study done by El Shahawy et al revealed significantly higher eradication rate when Vitamin D added to triple therapy²⁰ , however this is inconsistent with another study done in Japan by Hiroaki et al in 2017, who noted that a higher intake of vitamin D is associated with lower H. Pylori eradication rate²¹ .

Another finding of the current study was there was no association between the magnitude of the urea breath test as an indicator of severity of infection and the success rate of eradication, this inconsistent with previous study done by Boltin, D. et al revealed that higher magnitude of infection is associated with a greater degree of successful eradication of H. Pylori²² .

These discrepancies and unexpected findings of this study that is not consistent to previous studies may be related to the small sample size of the study and the probable explanation for this small size sample may be due to high cost of the UBT in private laboratories because it was not available in the public Hospital laboratory. Another factor behind the small size sample was that all other 41 patients have been contacted to come back for retesting but they confirmed good response for treatment and no more

complain, so they have not been persuaded to retest, so the eradication of H. Pylori was not proved in them and this may indicate that the eradication rate may be higher than we got in tested persons.

Although the current study is prospective but its small size as mentioned before is regarded as a limitation and further studies with large sample size with randomization is indicated because according to my knowledge no Randomised control trial had been done in

Iraq to clarify the influence of vitamin D on the eradication success rate of H. Pylori.

We recommend also repeating this study with a higher dose of Levofloxacin to 500my twice daily, after excluding the resistant strains of H. Pylori to Levofloxacin in the community.

In conclusion , our study did not confirm any impact of serum vitamin D on the eradication rate of H. Pylori infection by levofloxacin-based triple therapy and further study is needed in our locality.

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Availability of Data and Material:

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request

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